

CLAIMS

1. A method for forming an oxide film on the surface of a substrate
by a CVD method under the pressure conditions close to the atmospheric
5 pressure, the method comprising: using process gases of two components, a
raw gas (A) and a reactive gas (B); discharge processing the process gas (B)
out of the process gases (A) and (B) of two components; and joining the
process gas (A) not discharge processed with said process gas (B) discharge
processed in the vicinity of the surface of a substrate to mix them.
- 10 2. A method for forming an oxide film on the surface of a substrate
by a CVD method under the pressure conditions close to the atmospheric
pressure, the method comprising: using process gases of three components, a
raw gas (A), a reactive gas (B) and a H₂O gas (C); discharge processing the
process gas (B) out of the process gases (A) to (C) of three components; and
15 joining the process gas (A) and process gas (C) not discharge processed with
said process gas (B) discharge processed in the vicinity of the surface of a
substrate to mix them.
- 20 3. A method for forming an oxide film on the surface of a substrate
by a CVD method under the pressure conditions close to the atmospheric
pressure, the method comprising: using process gases of three components, a
raw gas (A), a reactive gas (B) and a H₂O gas (C); individually discharge
processing the process gas (B) and process gas (C) out of the process gases
(A) to (C) of three components; and joining the process gas (A) not discharge
processed with said process gas (B) and process gas (C) discharge processed

in the vicinity of the surface of a substrate to mix them.

4. A method for forming an oxide film on the surface of a substrate by a CVD method under the pressure conditions close to the atmospheric pressure, the method comprising: using process gases of three components, a raw gas (A), a reactive gas (B) and a H₂O gas (C); discharge processing a mixed gas having the process gas (B) and process gas (C) mixed out of the process gases (A) to (C) of three components; and joining the process gas (A) not discharge processed with said mixed gas discharge processed in the vicinity of the surface of a substrate to mix them.
5. A method for forming an oxide film on the surface of a substrate by a CVD method under the pressure conditions close to the atmospheric pressure, the method comprising: using process gases of three components, a raw gas (A), a reactive gas (B) and a H₂O gas (C); discharge processing the process gas (B) out of the process gases (A) to (C) of three components; and joining a mixed gas of the process gas (A) and process gas (C) not discharge processed with said process gas (B) discharge processed in the vicinity of the surface of a substrate to mix them.
6. An oxide film forming method according to any of Claims 15 to 19, wherein said raw gas (A) is a silicon-contained gas such as TMOS, MTMOS or the like.
7. An oxide film forming method according to any of Claims 15 to 20, wherein said reactive gas (B) is an oxidizing gas such as O₂, N₂O or the like.
8. An oxide film forming method according to any of Claims 15 to 21,

further comprising a gas supply source for supplying a process gas called a phosphorus-contained gas such as TMP, TEP or the like and / or a boron-contained gas (D) such as TMB, TEB or the like, wherein the process gas (D) is mixed with the process gas (A) for use.

- 5 9. An oxide film forming method according to any of Claims 1 to 8 wherein said joined gas forms a gas flow flowing along the surface to be processed of a substrate.
10. An oxide film forming method according to Claim 9, wherein by an exhaust mechanism, exhaust control is carried out so that said joined gas
- 10 forms a gas flow flowing along the surface to be processed of a substrate.
11. An oxide film forming method according to Claim 9 or 10, wherein the total flow rate of introductory flow rates of said raw gas and said reactive gas is approximately the same as the flow rate of the gas flow flowing along the surface to be processed of a substrate.
- 15 12. An apparatus for forming an oxide film on the surface of a substrate by a CVD method under the pressure conditions close to the atmospheric pressure, the apparatus comprising: a gas supply source for supplying process gases of two components, a raw gas (A) and a reactive gas (B), and a discharge processing section, wherein the process gas (B) out of the process gases (A)
- 20 and (B) of two components is subjected to discharge processing by the discharge processing section; and the process gas (A) is joined, in the vicinity of the surface of a substrate, without discharge processing, with the process gas (B) discharge processed to mix them, in the discharge processing section.
13. An apparatus for forming an oxide film on the surface of a substrate by

a CVD method under the pressure conditions close to the atmospheric pressure, the apparatus comprising: a gas supply source for supplying process gases of three components, a raw gas (A), a reactive gas (B) and a H₂O gas (C), and a discharge processing section, wherein the process gas (B) out of the process gases (A) to (C) of three components is subjected to discharge processing by the discharge processing section; and the process gas (A) and the process gas (C) are joined, in the vicinity of the surface of a substrate, without discharge processing, with the process gas (B) discharge processed to mix them.

14. An apparatus for forming an oxide film on the surface of a substrate by a CVD method under the pressure conditions close to the atmospheric pressure, the apparatus comprising: a gas supply source for supplying process gases of three components, a raw gas (A), a reactive gas (B) and a H₂O gas (C), and a discharge processing section, wherein the process gas (B) and process gas (C) out of the process gases (A) to (C) of three components are subjected to discharge processing in individual discharge processing section, and the process gas (A) is joined, without discharge processing, with said process gas (B) and process gas (C) discharge processed in the vicinity of the surface of a substrate to mix them.

15. An apparatus for forming an oxide film on the surface of a substrate by a CVD method under the pressure conditions close to the atmospheric pressure, the apparatus comprising: a gas supply source for supplying process gases of three components, a raw gas (A), a reactive gas (B) and a H₂O gas (C), and a discharge processing section, wherein a mixed gas having the process gas (B) and process gas (C) mixed out of the process gases (A) to (C) of three

components is subjected to discharge processing by the discharge processing section; and the process gas (A) is joined, in the vicinity of the surface of a substrate, without discharge processing, with the mixed gas discharge processed to mix them.

- 5 16. An apparatus for forming an oxide film on the surface of a substrate by a CVD method under the pressure conditions close to the atmospheric pressure, the apparatus comprising: a gas supply source for supplying process gases of of three components, a raw gas (A), a reactive gas (B) and a H₂O gas (C), and a discharge processing section, wherein the process gas (B) out of the process
- 10 gases (A) to (C) of three components is subjected to discharge processing in the discharge processing section; and the mixed gas of the process gas (A) and the process gas (C) is joined, in the vicinity of the surface of a substrate, without discharge processing, with the process gas (B) discharge processed to mix them.
- 15 17. An oxide film forming apparatus according to any of Claims 12 to 16, wherein said raw gas (A) is a silicon-contained gas such as TMOS, MTMOS or the like.
18. An oxide film forming apparatus according to any of Claims 12 to 17, wherein said reactive gas (B) is an oxidizing gas such as O₂, N₂O or the like.
- 20 19. An oxide film forming apparatus according to any of Claims 12 to 18, wherein the quantity of said process gas (B) out of the process gases used in the CVD method is in excess of 50 weight % of the whole process gas, and the weight ratio between said process gas (A) and said process gas (C) [process gas (A) / process gas (C)] is 1/100 to 1/0.02.

20. An oxide film forming apparatus according to any of Claims 12 to 19, wherein the supplying total of process gases of said three components is 1 to 300 SLM.

21. An oxide film forming apparatus according to any of Claims 12 to 20,
5 further comprising a gas supply source for supplying a process gas called a phosphorus-contained gas such as TMP, TEP or the like and / or a boron-contained gas (D) such as TMB, TEB or the like, wherein the process gas (D) is mixed with the process gas (A) for use.

22. An oxide film forming apparatus according to any of Claims 12 to 21,
10 wherein the distance between said discharge processing section and the surface of a substrate placed on a substrate place section is 0.5 to 30 mm.

23. An oxide film forming apparatus according to any of Claims 12 to 22, wherein the substrate place section for placing the substrate and said discharge processing section are moved relatively in one direction or in both
15 directions whereby the substrate can be carried one way or return relatively, a gas emitting port of the process gas not discharge processed is arranged in the midst of the substrate carrying course, and gas emitting ports of the process gas discharged processed are arranged forward and backward with respect to the substrate carrying direction of said first mentioned gas emitting port.

20 24. An oxide film forming apparatus according to Claim 23, wherein the process gas discharge processed emitted from said gas emitting ports arranged forward and backward with respect to the substrate carrying direction is the same process gas.

25. An oxide film forming apparatus according to Claims 12 to 24,

comprising an exhaust mechanism for exhaust controlling the direction in which a joined gas of said reactive gas and said raw gas flows.

26. An oxide film forming apparatus according to Claim 25, wherein said exhaust mechanism is arranged on the side close to the plasma space on the side at a distance of a flow passage of the joined gas from a place where said reactive gas and said raw gas are joined.

27. An oxide film forming apparatus according to Claim 25, wherein said exhaust mechanisms are arranged on both sides of said joined place, and the conductance of the flow passage on the side close to the plasma space, out of the joined gas flow passages from the joined place to the exhaust mechanism, is small.

28. An oxide film forming apparatus according to any of Claims 25 to 27, wherein there is provided a gas flow regulating plate for forming a joining gas flow passage along the surface to be processed.

29. An oxide film forming apparatus according to Claim 28, wherein a ceramic porous gas flow regulating plate is provided, and an inert gas is emitted from said gas flow regulating plate.